(#000002231);

- Ace Machine Co., Inc. located at 9 Gigante Drive, Hampstead, New Hampshire (#NHS000001828);
- Edgefield Veterinary Hospital located at 269A Stage Road, Hampstead, New Hampshire (#NHD986484525);
- CFT Corp. located at 1 Gigante Drive, Hampstead, New Hampshire (#NHS000002392); and
- Charles D. White, DMD located at 29 Island Pond Road, Atkinson, New Hampshire.

Source Water Protection Area

A total of eight Source Water Protection Areas associated with public water supplies (a 0.25 mile radius from the public water supply) are listed as being located within a 1.0 mile radius of JJA. Those Source Water Protection Areas whose 0.25 radial zone extends to within a 0.5 mile radius of JJA are those associated with the Public Water Supply Inventories described above and the following:

- The Source Water Protection Area for the public water supply system known as Bricketts Mill located at Route 121, Brickett Mills Road, Hampstead, New Hampshire. This system is listed a having three separate supplies (PWS ID#1032040-001, #1032040-002, and #1032040-003).

Underground Storage Tank Inventory

A total of four listings are included in this inventory. Only one site is listed as being located within a 0.5 mile radius of JJA:

- Contech Plastics located at Route 111, Hampstead, New Hampshire: No active tanks are noted for this site.

Water Well Inventory

This inventory consists of private water supply wells. A total of 17 wells are listed as

being located within a 1.0 mile radius of JJA. However, all of the listed wells are located greater than 0.5 miles from JJA.

4.3.3 NHDES File Review

A review of files for selected sites was performed at the NHDES based on the information obtained from the previously described databases. Based on the nature of the site listing and distance from JJA, Cushing & Jammallo requested information on the following sites:

- Kinney's Garage;
- Hampstead Highway Garage;
- David and Joyce Residences;
- Alliant Specialty Metals; and
- Land and Sea, Inc.; and
- Johnson & Johnston Associates, Inc.

Of these sites, a summary of the information available in the Alliant Specialty Metals, Land and Sea, and the JJA files follows and is presented below in chronological order. These three sites were selected for discussion because of the nature of the environmental matter at the site and/or the proximity of the site to JJA. Information obtained from the NHDES files on these entities is presented in Appendix F.

Alliant Specialty Metals

No information was obtained from the NHDES concerning Alliant Specialty Metals.

Land and Sea, Inc.

The following information for Land and Sea concerns the removal of a 1,000-gallon UST that contained methyl tert-butyl ether (MTBE) that was located on the Land and Sea property.

- Letter of March 21, 1997 from New England Environmental Technologies Corp (NEET) to Land & Sea: This letter describes the "...results of drinking water

sampling and analysis..." of samples collected "...from the tap/hose connection located inside the [Land & Sea] building, near the rear, northeast corner of the...facility". The source of water to the tap was Land & Sea's on-site water supply well. This sample was submitted to a laboratory for analysis of VOCs by EPA Method 502.2. The results revealed MTBE in a concentration of 268 parts per billion (ppb). NEET notes that the NHDES AGQS for MTBE was 100 ppb. NEET recommended that Land & Sea notify the NHDES within 60 days in accordance with Env-Ws 410 and that Land & Sea notify its employees "...of the unsuitability of the water for drinking water purposes."

- Letter of March 24, 1997 from NEET to the NHDES: Transmittal of UST Closure Report for a 1,000-gallon UST containing MTBE at Land & Sea. The UST Closure Report was prepared by NEET and dated September 24, 1996. This report documents the removal of a 1,000-gallon UST containing MTBE on September 11, 1996. According to drawings prepared by NEET, this tank was located adjacent to the eastern exterior of the Land and Sea building. The steel UST measured 4 feet wide by 10.67 feet long and "...appeared to be in good condition, with no evidence of pitting, holes, or leaks associated with the UST or piping." NEET did, however, note "...visual and olfactory evidence of a release...during the removal activities, near the east wall of the excavation..." Upon removal of the UST, NEET collected soil samples from the sidewalls and bottom of the excavation. Groundwater was not encountered within the excavation that extended to a depth of six feet below grade.

  Soil samples collected from the excavation were screened with a flame ionization detector (FID) for the presence of VOCs. The total VOC concentrations at depths of four to six feet ranged from "...below the detectable limit of 0.1 part per million (ppm) to 45 ppm.", with the greatest concentration encountered from a sample from the east wall of the excavation near the vent pipe. Soil samples from the bottom of the excavation and from the east wall were also submitted to a laboratory for analysis of VOCs by EPA Method 505.2. MTBE was detected at a concentration of 5.9 ppm in the sample collected from the east wall of the excavation. NEET noted that this concentration was in excess of the NHDES Cleanup Guideline of 0.6 ppm. NEET concluded that:

- "The UST was in excellent condition, however, evidence of past overfills was found…It is likely that excess MTBE product was forced out the ventilation system during overfilling."
- "The concentration of MTBE observed in the soil sample collected from the east wall of the excavation exceeds cleanup standards set forth by the [NHDES] for virgin petroleum contaminated soils."
- "Notification of a release of oil and/or hazardous materials to the [NHDES] is required in accordance with Env-Ws 412.04."

NEET recommended that the release be reported to the NHDES and that a Remedial Action Plan be submitted to the NHDES in accordance with Env-Ws 412.12.

- Letter of April 24, 1997 from NEET to Land & Sea: Transmittal of the "…results of the drinking water sampling and analysis…" of a sample collected on April 22, 1997 from a tap at Alliant Metals which is located just west of Land & Sea. NEET states that the Alliant Metals' bedrock supply well is located approximately 50 feet southwest of the former MTBE UST on the Land & Sea property. The sample was submitted to a laboratory for analysis of VOCs by EPA Method 502.2. The results revealed that the following compounds were detected: MTBE at 56 ppb; 1,1-dichloroethene at 5.4 ppb; 1,1-dichloroethane at 10 ppb; and trichloroethene at 5 ppb. NEET noted that the concentrations of all four compounds were below the applicable AGQS.

- Internal NHDES memorandum dated June 6, 1997 prepared by Walter Carlson: Summary of telephone conversation between Walter Carlson of the NHDES and David Niemeyer of NEET. Among other things, the memorandum states that David Niemeyer indicated that the MTBE UST was closed on March 24, 1997. Mr. Carlson could not find a UST Closure Report for Land and Sea.

- Letter of July 9, 1997 from the NHDES to Land and Sea: NHDES acknowledges the receipt of the September 24, 1996 UST Closure Report and letters dated March 24, 1997 and April 24, 1997 concerning the results of drinking water well

samples at Land and Sea and Alliant Metals. NHDES states the transmittal of the UST Closure Report meets the "notification of groundwater quality violation requirements on Env-Ws 410.06". The NHDES noted that its S-1 soil standard, as listed in the Risk Characterization and Management Policy was 3 mg/kg. The concentration of the soil sample that NEET collected from the east wall of the UST excavation of 5.9 mg/kg. In regard to the UST Closure Report, the NHDES concurred with NEET's recommendation for the preparation of a Remedial Action Plan. Further, the NHDES advised that the Remedial Action Plan "...will need to address soils contaminated with MTBE, on-site groundwater contamination, and off-site groundwater contamination. In regard to the VOC contamination detected in the water supply wells at Land and Sea and Alliant Metals, the NHDES "...advised that there is a history of low levels of groundwater contamination by trichloroethene and other volatile organic compounds similar to those detected in the Alliant well in the area of Hampstead where Routes 111 and 121 intersect".

- Letter of August 18, 1997 from NEET to NHDES: NEET presents the results of tap samples collected on July 22, 1997 and August 1, 1997 from Land and Sea and from JJA. The samples were tested for VOCs. The results of the samples collected from Land and Sea revealed MTBE in concentrations of 16.1 ppb and 19.1 ppb, respectively. The sample collected from JJA contained 45.8 ppb of MTBE and "detectable concentrations of 1,1-dichloroethene; 1,1-dichloroethane; 1,1,1-trichloroethane, and tetrachloroethene". NEET stated that the sample was collected "...after passing through what is believed to be a granular activated carbon filter." NEET further noted that "actual in-situ contaminant concentrations are expected to be higher".

  NEET recommended that "...the soil proximal to the former east wall of the UST excavation be excavated and removed. Removal of the MTBE impacted soils should prevent further degradation of the groundwater quality conditions on site, by removing the 'source' of MTBE near the ground surface, and reducing potential impacts to the groundwater via surface water infiltration". NEET requested permission to excavate approximately 20 cubic yards of MTBE contaminated soil and store the soil on-site, "...above and below loosely fitted black polyethylene sheeting, for the purpose of aerating and volatilizing the MTBE

within the soils." NEET stated that they did not recommend the submittal of a Remedial Action Plan of Groundwater Monitoring Permit "until such time that the source of MTBE has been removed, and additional monitoring of the on-site water supply has been conducted".

- Letter of September 9, 1997 from NHDES to Land Sea: NHDES has reviewed the NEET letter of August 18, 1997. NHDES states that Land and Sea will have to contact the NHDES Air Resources Division and "secure their approval" for the on-site aeration of the MTBE impacted soils before soil treatment may begin. The NHDES states that it concurs with NEET's recommendation to remove the contaminated soils and conduct further assessment and monitoring of on-site and off-site groundwater quality.

- Letter of October 6, 1997 from NEET to NHDES: NEET transmits a Remedial Action Completion report , dated October 6, 1997. NEET excavated soils in the vicinity of the former MTBE UST on September 23, 1997. The excavations dimensions were 18 feet by 12 feet. Depth ranged from 5 feet to 8 feet below grade where bedrock was encountered. NEET monitored excavated soil with a flame ionization detector (FID) and collected confirmatory soils for laboratory testing of VOCs by EPA Method 502.2. No detectable concentrations of VOCs were reported. NEET concluded that:

    - "...the levels of MTBE in the soil on site [have] been reduced to background levels... and ...aeration of soils during the UST removal and continued aeration of in-situ soils through loosely compacted backfill has reduced the levels of MTBE to background."
    - "Results of recent sampling and analysis of the on site supply well indicate MTBE was detected at a level well below the acceptable drinking water standard of 100 ppb. No additional volatile organic compounds were observed in the samples collected from the on site supply well.
    - "A spring water cooler is utilized as a potable water supply on site;" and
    - Levels of VOCs observed in off site drinking supply wells can be attributed to history of groundwater contamination identified in the area of Hampstead where Routes 111 and 121 intersect."

- Letter of October 29, 1997 from the NHDES to Land and Sea: NHDES states that it has reviewed the Remedial Action Completion Statement, dated October 6, 1997, prepared by NEET and that Land and Sea may obtain a "Certificate of No Further Action" once Land and Sea has demonstrated that groundwater quality at the site meets the NHDES' AGQS, that there are no on-going sources of groundwater contamination, and that soils at the site meet the NHDES' Risk Characterization and Management Policy Soil Standards.

- Letter of November 18, 1997 from NEET to NHDES: NEET transmits the results of drinking water analyses. Samples were collected on November 4, 1997 from the supply wells located at Land and Sea, Alliant Metals, and JJA and submitted for laboratory analysis of VOCs by EPA Method 8260. The results revealed the following detectable levels of VOCs: In the Land and Sea well, 69 ppb of MTBE; in the Alliant well, 2.2 ppb of 1,1-dichloroethene and 48 ppb MTBE; and in the JJA well, 2.5 ppb of 1,1-dichloroethene; 5 ppb of 1,1-dichloroethane; 7.1 ppb of trichloroethene; and 5.1 ppb of MTBE. NEET states that there were no exceedences of AGQS. Based on these testing results and those submitted to the NHDES on October, NEET requests that a "Certificate of No Further Action" be issued to Land and Sea.

- Letter of January 20, 1998 from NHDES to Land and Sea: NHDES states that it requires two consecutive rounds of groundwater quality sampling and analysis to confirm that the AGQS have not been exceeded. NHDES states that they have revised the AGQS for MTBE from 100 micrograms per liter (ug/l) to 70 ug/l. The NHDES further states that Land and Sea currently meets the Risk Characterization and Management Policy requirements for the issuance of a "Certificate of No Further Action" and that Land and Sea should consider this letter as such a certificate.

- Letter of April 12, 1998 from NEET to the NHDES: NEET submits the results of sampling and analysis of a water sample from the drinking well at Land and Sea. NEET states that the sample was collected on March 19, 1999. NEET also summarizes the testing results of a sample of water collected from the same well

on October 27, 1998. (The reader will note that the sample collection dates do not correspond chronologically with the date of the letter.) The results indicated that MTBE was detected in the Land and Sea supply well in concentrations of 35 ppb (sample date 10/27/98) and 48 ppb (sample date 3/19/99). NEET stated that the "...revised Method 1 GW-1 Standard of 70 ppb for MTBE has not been exceeded..." and that the "...MTBE contamination found in the Land and Sea well has decreased significantly in the past year and is expected to continue to decrease to below GW-1 Standards in the near future".

- Letter of May 11, 1998 from NEET to NHDES: Transmittal of laboratory testing results of samples collected on April 9, 1998 from water supply wells located on Land and Sea, Alliant Metals, and JJA for VOCs. The results indicated that MTBE and 1,1-dichloroethene were detected in the Land and Sea supply well in concentrations of 80 ppb and 2.2 ppb, respectively. The MTBE concentration was in excess of the 70 ppb Method 1 GW-1 Standard. 1,1-Dichloroethene (2.7 ppb); 1,1-dichloroethane (5.0 ppb); and MTBE (59 ppb) were detected in the Alliant Metals well. 1,1-Dichloroethene (6.6 ppb); 1,1-dichloroethane (17 ppb); 1,1,1-trichloroethene (3.3 ppb); and MTBE (6.8 ppb) were detected in the JJA well.

- Letter of May 28, 1998 from the NHDES to Land and Sea: NHDES states that it is in receipt of the April 9, 1998 testing results of the Land and Sea drinking water well and the adjacent wells. The NHDES states that the Alliant Metals and the JJA wells are in compliance with the AGQS and that no additional sampling is required. AGQS for the Land and Sea well, however, were exceeded for MTBE. The NHDES required that an additional round of sampling be conducted on the Land and Sea well.

- Letter of November 16, 1998 from NEET to the NHDES: Transmittal of laboratory testing results for VOCs of a water sampled collected from the Land and Sea water supply well on October 27, 1998. Results revealed MTBE in a concentration of 35 ppb.

- Letter of May 26, 1999 from NHDES to Land and Sea: NHDES states that, based on the March 19, 1999, the Land and Sea well was in compliance with AGQS for

two consecutive rounds of sampling and "no additional groundwater sampling and analysis will be required..." The NHDES further "...determined that a Certificate of No Further Action is appropriate...no further action is necessary...and site closure is appropriate". The NHDES stated they were removing the site from its active project list and said that Land and Sea could consider this letter as a "Certificate of No Further Action".

JJA

- NHDES Environmental Response/Incident Report dated October 25, 1989: This report identifies a spill of 15 to 20 gallons of 1,1,1-tricholorethane. The human health/environmental hazards are described as "minimal due to clean-up". This document refers to an attached report, which is dated October 16, 1989. The NHDES indicated that no further action was required. This release is further discussed in Section 3.0 herein.

- N.H. Department of Safety, Hazardous Materials Unit Incident Report dated January 27, 1990: This report describes the fire that occurred at JJA on January 27, 1990. Deputy Fire Chief Paul Wentworth noted that there was a need to use foam on several tanks of chemicals inside the building. Upon entering the building, the fire fighters observed a "300-gallon bulk storage tank of trichloroethane was against the west wall of the building" and checked for other storage tanks and drums of chemicals in the building. None were found. A Raymond, New Hampshire firefighter who arrived on the scene (and who also worked as a truck driver for JJA) pointed out several other locations where he thought chemicals might be located. These locations, however, are not mentioned in this report. The Hampstead Police Dept. contacted Mr. Dan Goldsmith of JJA. Mr. Goldsmith provided the "location and approximate quantity of the chemicals in the building...the only other chemical that [JJA] used was Frekote."

  After the fire was over, the Fire Department surveyed the remains of the building interior. The "only concern" that the Fire Department had as part of this survey was a drum, with no legible labels, that had expanded in the fire. This drum was packed in a steel salvage drum by the "Derry Haz-Mat truck". In addition to this

drum, approximately fifteen drums were located north of and exterior to the building. The drums were labeled with Hazardous Waste labels and most of the drums are described as containing waste. This information was supplied to the NHDES.

- Three photographs dated January 27, 1990: These photographs are of 55-gallon drums stored outside. Each photograph is labeled "1-27-90 Johnson & Johnston Hampstead" It is unclear as to who took the photographs. One drum is labeled as "Used F"; another drum is labeled as "Used Trichlor".

- NHDES Memorandum dated May 17, 1990: Memorandum describes a site inspection by Selina J. Makofsky and David Leathers. JJA building was boarded up due to recent fire. Thirty-one 55-gallon steel drums were observed north of the building. Seventeen drums were found to be empty; fourteen drums were identified as containing a substance. Contents of drums with labels were described as follows: "Mobil Steam Turbine Oil", "Used F" with the remaining letters spelling Frekote covered with duct tape, and "Frekote". Photographs are attached to the memorandum with dates and descriptions on rear of photographs.

  The memorandum also describes a box trailer with thirteen 5-gallon containers with "Frekote" labels on them.

- NHDES, Waste Management Division Activity Notes Concerning JJA: One sheet listing various activities from October 1989 to August 4, 1993. Includes a listing for "Incident Report Trichloro Spill" dated August 1989, "Photos from Site" dated January 27, 1990, "Fax of Drum Inventory" dated May 18 and 22, 1990, "Incident Report" dated May 25, 1990.

- NHDES Hazardous Waste Generator RCRA Inspection Checklist, Inspection date of February 22, 1994: Includes a section of manifests which lists the following wastes: trichloroethylene, fluorocarbon, oil waste. A section of the checklist described as Hazardous Waste Profile includes the following wastes based on an annual activity report from January 1993 to December 1993: waste 1,1,1-trichloroethane (1,509 lbs./month); mixed solvents (83 lbs./month); lab pack-lead

(3 lbs./month); hydraulic oil (42 lbs./month); and trichloro-ene and fluorocarbon (38 lbs./month). Checklist also describes temporary discharge of non-contact cooling water and questions whether this discharge should be permitted.

- NHDES Letter of Deficiency No. WMD-94-05" to JJA dated April 7, 1994: This letter discusses the results of an inspection of JJA conducted by the NHDES on February 22, 1994 and cites eight deficiencies, one of which was related to whether the contents of two containers located exterior to the building were hazardous.

- Letter of April 27, 1994 from JJA to NHDES: This letter is in response to NHDES' Letter of Deficiency No. WMD-94-05 concerning non-contact cooling water. The letter describes a temporary measure for a vapor degreaser that included a water line run from the on-site well that was through a coil and out onto the ground. "The flow in the line contained only water." JJA further described the temporary line as being discontinued as of April 18, 1994.

- Letter of May 4, 1994 from JJA to NHDES: This letter is in response to NHDES' Letter of Deficiency No. WMD-94-05 and describes the correctives measures taken for the eight deficiencies.

- Letter of May 24, 1994 from NHDES to JJA: Letter references NHDES' Letter of Deficiency No. WMD-94-05 and states that the NHDES has determined that JJA is presently in compliance.

- NHDES, Waste Management Division Activity Notes Concerning JJA: Two sheets listing activities from February 22, 1994 to June 10, 1994. This listing includes several of the above-discussed items.

4.4 Local File Review

Selected records concerning information in the Town of Hampstead's and Town of Atkinson's files are presented in Appendix F.

4.4.1 Hampstead Building Inspector's, Assessor's, and Board of Health Office

The Building Inspector's Office and the Assessor's Office are combined. Ms. Dawn M. Snow provided Cushing & Jammallo with a file on JJA. The file contained numerous documents including applications for building permits [building additions, enclosing small part of production line with fire rated walls, for addition of office space, for alteration (training area), for warehouse, for demolition], approvals for construction, approvals for operation, and certificates of use and occupancy. In addition, the files contained two letters to JJA from the NHDES concerning vapor degreasers. One, dated June 3, 1998, concerned a permit for "#4 48" X 30" vapor degreaser". The permit's emission limits included those regarding trichloroethene. The second letter, dated July 20, 1998, concerned a temporary permit to operate "48" X 30" vapor degreaser #2. The permit's emission limits included those regarding trichloroethene.

The file also contained correspondence and plans on JJA's septic systems. Several letters were in the file concerning problems with the septic system (assumed to be the septic system associated with the Operations Building given that the letters were dated 1994). Apparently, the design of the septic system was too small for the number of people in the building.

Cushing & Jammallo obtained an Assessor's sheet for Lot 64, Map 6 in Hampstead upon which the Operations Building is constructed. This sheet contained the following information:

- Total Acres: 2.3
- Owner: Di John Realty Co.
  C.A. DiDonoto & J.A. Johnston
  130 Route 111
  Hampstead, New Hampshire 03841
- Building Construction: Prefinished metal exterior with a concrete floor base.
- Year Built: 1990
- Style: Light Manufacturing
- Building Dimensions: 200 feet x 60 feet

Cushing & Jammallo spoke with Mr. Proctor Wentworth who is associated with the Building Inspector's Office and the Board of Health. Mr. Wentworth indicated that he could not recall any environmental issues at JJA.

4.4.2 Hampstead Town Library

No City Directories were available at this library. A Flood Insurance Rate Map and Street Index (Panel No. 330211 0005A, dated June 16, 1993) showed JJA to be located in Zone X that was described as "area outside of 500 year flood".

4.4.3 Hampstead Fire Department

JJA contacted Mr. Walter Hastings of the Hampstead Fire Department on April 28, 2000. Mr. Hastings supplied the following information regarding JJA environmental matters. He was aware of the fire that destroyed the JJA Operations Building in January 1990. However, he was out of the country at the time.

Mr. Hastings was not aware of any USTs at JJA. He further indicated that the Fire Department does not maintain files on existing USTs. Rather, only UST removals are documented.

Mr. Hastings did note that he was aware of complaints from neighbors of odors emanating from JJA although he was not specific as to the type of odors nor those neighbors who filed the complaints.

4.4.4 Atkinson Planning, Code Enforcement Office, and Board of Health

The Code Enforcement and Board of Health office for the Town of Atkinson are included under the Planning Office. Cushing & Jammallo visited these offices on May 1, 2000 and reviewed the available files on JJA. The files included various permits, plans and letters. The following were considered significant to this investigation.

A building permit was issued on August 25, 1998 for a 220 feet X 150 feet foundation

with walkways for Map 21, Lot 4-1. Another building permit was issued by the Town on September 30, 1998 for the metal roof and siding, and forced hot air furnace for this structure. A certificate of occupancy for this structure was issued by the Town on February 5, 1999.

A letter, dated July 31, 1998, was also in the file. This letter, prepared by the law firm of Boudreau, Mitchell & Davis for a landowner in Atkinson, New Hampshire, was addressed to the Town. No information concerning the landowner was provided. The letter stated that there was concern that JJA experienced "significant and serious mishaps in the past regarding hazardous waste, and explosive and extremely corrosive chemicals were used" by JJA. In a response dated October 3, 1998, the Office of the Selectmen stated that the "concerns are of a serious nature" and that the Planning Board and the Building Inspector were submitting reports to the Board of Selectman. There was no other correspondence regarding this matter in the file.

4.4.5 Atkinson Assessor's Office

Cushing & Jammallo obtained an Assessor's sheet for Lot 4, Map 21 in Atkinson upon which the Warehouse Building is constructed. This sheet contains the following information:

- Total Acres: 5.471
- Owner: Di John Realty Co.
  130 Route 111
  Hampstead, New Hampshire 03841
- Building Construction: Prefinished metal exterior with a concrete floor base.
- Year Built: 1998
- Style: Warehouse/Office
- Building Dimensions: 220 feet x 150 feet

4.4.6 Atkinson Fire Department

Cushing & Jammallo contacted Mr. Michael Murphy of the Atkinson Fire Department on April 28, 2000 concerning storage tanks at JJA. Mr. Murphy indicated that there were no records of USTs or above ground storage tanks (ASTs) at JJA. Further, he could not recall any other environmentally-related matters associated with JJA.

4.4.8 Kimball Public Library

On May 1, 2000, Cushing & Jammallo visited the Kimball Public Library and spoke with Mr. Paul Regan who is President of the Historical Society. Although he was not aware of any environmental maters at JJA, Mr. Regan was to check on any environmental maters related to JJA that might be on record at the library. To date, Mr. Regan has not corresponded with Cushing & Jammallo.

5.0 APPLICABLE SOIL AND GROUNDWATER QUALITY STANDARDS / CATEGORIES

5.1 General

The investigation, remediation, and management of releases or discharges of contaminants and characterizing risks to human health and the environment posed by the contaminants to site soil and groundwater within the State of New Hampshire are defined by various standards that are included in certain Rules and Policies established by the State of New Hampshire and the NHDES. Specific to this Site Investigation are the:

- New Hampshire Code of Administrative Rules Env-Wm 1403, "Groundwater Management and Groundwater Release Detection Permits". The purpose of these rules is "...to establish procedures and requirements for investigating, remediating, and managing contamination for sites where discharges of regulated contaminants have occurred and to establish procedures for monitoring the groundwater for early detection of any impact...", and

- the NHDES "Contaminated Sites Risk Characterization and Management Policy", dated January 1998. This policy describes a tiered, risk-based approach to characterize risks to human health and the environment posed by the release of contaminants at sites in New Hampshire. The policy, compliments various Administrative Rules and regulations applicable to the remedial action process and include requirements for treatment, removal, or containment of contaminant source areas, site notification, groundwater management permits, etc.

5.2 Ambient Groundwater Quality Standards

New Hampshire Code of Administrative Rules Env-Wm 1403, "Groundwater Management and Groundwater Release Detection Permits" presents AGQS in Section 1403.05. AGQS "...apply to all regulated contaminants which result from human operations or activities" and, as defined in RSA 485-C:2, I, are the "maximum concentration levels for regulated contaminants in groundwater which result from human operations or activities, as delineated in RSA 485-C:6". A reporting obligation to the NHDES exists if any one contaminant identified in groundwater at a site exceeds the applicable standard as provided in Table 1403-1 of the "AGQS". JJA has reported exceedances of AGQS by way of its January 24, 2000 letter to the NHDES.

Further, Env-Wm 1403 states that, unless due to a natural condition or unless exempt due to specific criteria, the following criteria apply to all groundwater within the State of New Hampshire:

- Groundwater shall be suitable for use as drinking without treatment;
- Groundwater shall not contain any regulated contaminant at a concentration greater than the AGQS; and
- Groundwater shall not contain any contaminant at a concentration such that the natural discharge of that groundwater to surface water will cause a violation of a surface water quality standard.

5.3 Risk-Based Standards for Groundwater and Soil

Although there is no available document that specifies levels of contaminants in soils that would require reporting, telephone discussions with Mr. John Regan, Supervisor of the State Hazardous Waste Sites at the NHDES, revealed that the NHDES presently considers a reporting obligation to exist if one or more contaminants exist in concentrations above those established for soil category NH S-1 of the Method 1 Soil standards (Table 3) published in the NHDES document entitled "Contaminated Sites Risk Characterization and Management Policy", dated January 1998.

This document is also used to characterize risks to human health and the environment posed by the release of contaminants at sites in New Hampshire. A Risk Characterization provides quantitative and qualitative information to:

- evaluate the risk of harm to human health and the environment that exists at a site due to the release of contaminants to soil and groundwater;
- evaluate how the identified risks will be addressed;
- determine whether a remedial action or additional response actions are necessary; and
- determine whether conditions that are protective of human health and the environment exist or have been achieved.

The NHDES has established categories of groundwater and soil for use in the characterization of risk at sites.

6.0 SUBSURFACE INVESTIGATION

This section of the report discusses the subsurface investigations that were performed by Cushing & Jammallo as part of the Site Investigation program. The subsurface investigation performed by ATC in November 1999 is not reiterated herein in detail; one should refer to the ATC report for specifics of that investigation.

From May 25 to July 21, 2000, Cushing & Jammallo performed a subsurface investigation program at the Site associated with the Site Investigation. The following activities were

completed for the subsurface investigation program:

- advancement of five borings to depths ranging from 30 feet to 50 feet below the ground surface. Two borings (CJ-4S and CJ-4D) were completed with a combination of a hollow-stem auger truck-mounted drilling rig to advance the boring through unconsolidated soils and a 4-inch diameter downhole air hammer to advance the boring through bedrock. The remaining three borings (CJ-1, CJ-2, and CJ-3) were completed through bedrock with the use of a 4-inch diameter downhole air hammer.

- installation of groundwater monitoring wells within five (5) of the completed borings [one well (CJ-4S) was completed within the overburden soils and four wells (CJ-1, CJ-2, CJ-3, CJ-4D) were completed within the bedrock];

- screening of select subsurface soil samples from the boring associated with CJ-4S with a photoionization detector (PID) for the potential presence of volatile organic vapors;

- collection and laboratory analysis of select subsurface soil samples from boring CJ-4S;

- collection and laboratory analysis of one round of groundwater samples from the three existing water supply wells at the Site and two rounds of groundwater samples from the one water supply well located at Alliant Specialty Metals;

- collection and laboratory analysis of two rounds of groundwater samples from two monitoring wells previously installed by ATC [ATC-2 (one round only from ATC-2) and ATC-4-2] and newly installed monitoring wells CJ-1, CJ-2, CJ-3, CJ-4S, and CJ-4D;

- measurement of the depth to water in the monitoring wells as part of each sampling round; and

- a survey including the elevation and location of the monitoring wells.

6.1 Soil Borings, Bedrock Rock Drilling, and Monitoring Well Installations

The borings were performed by New Hampshire Boring, Inc. of Derry, New Hampshire on May 25, 26, 30, and 31, 2000 with an all-terrain vehicle. The locations of the borings are generally described as follows. Refer to Figure 2 for the boring/well locations.

- CJ-1: located just east of the paved drive off of Route 111 that leads to the JJA Warehouse Building;
- CJ-2: located just south of the Operations Building;
- CJ-3: located just south of the septic system that serves the Operations Building and adjacent to monitoring well ATC-4-2; and
- CJ-4S and CJ-4D: located just north of the Operations Building.

Exposed bedrock is located at the ground surface south of the Warehouse and Operations Buildings. Therefore, since it was anticipated that borings CJ-1, CJ-2, and CJ-3 would encounter competent bedrock within ten feet of the ground surface at these locations, borings were initiated with the use of a 4-inch diameter down-hole air hammer that pulverized the bedrock. This drilling method for advancing the borehole through bedrock was discussed with Mr. James Zeppieri of the NHDES. Mr. Zeppieri was of the opinion that the air hammer method was an appropriate method for use in the Site Investigation. Bedrock was encountered at depths of 4 feet, 7 feet, and 10 feet below ground surface in borings CJ-1, CJ-2, and CJ-3, respectively. CJ-1 was advanced to a depth of approximately 36 feet within bedrock; CJ-2 was advanced to a depth of approximately 30 feet within bedrock, and CJ-3 was advanced to a depth of approximately 31 feet within bedrock. Monitoring wells were constructed in each of these three borings as described below.

The boring associated with CJ-4S was initiated with 5-foot lengths of hollow-stem auger that were approximately 7.25-inches in outside diameter and had a hollow core approximately 4.25-inches in diameter. Soil samples were collected from this boring using a 2-foot long steel, split-spoon sampler, in accordance with the American Society for Testing of Materials (ASTM) *Standard Penetration Tests* (SPT) Method D 1586-84. Split-spoon soil samples were attempted at 5-foot depth intervals to a depth of 23 feet below grade. Since the augers could not be advanced past this depth, it appeared that bedrock had been encountered. Therefore, the air hammer method was used from this point to advance the boring. However, given that the material being extruded from the borehole was soil and the reaction of the air hammer, it was determined that the air hammer was being advanced through till from a depth of approximately 23 feet to approximately 32 feet below grade where bedrock was ultimately encountered. The air hammer continued to a depth of approximately 45 feet below grade where a bedrock monitoring well was to be installed. However, the continual plugging of the borehole within the bedrock depth range with till did not

facilitate the construction of a bedrock monitoring well at this location. Therefore, this borehole was utilized to construct a monitoring well within the unconsolidated soils primarily above the depth range where the till was encountered. Soil samples retrieved from this boring were physically characterized and information recorded on soil boring logs. Samples were also screened in the field with the use of a Thermo-Electron Model 580B photoionization detector PID for the presence of organic vapors. Refer to Section 7.0 for the results of the field screening of soil samples.

Boring CJ-4D was completed as a bedrock monitoring well in the immediate vicinity of CJ-4S. The boring associated with CJ-4D was initiated with 5-foot lengths of hollow-stem augers that were advanced to a depth of approximately 34.5 feet, considered to be the depth of competent bedrock. The borehole was continued to a depth of approximately 50 feet with the down-hole air hammer after which a monitoring well was installed as described below.

A Cushing & Jammallo field scientist was present during the drilling program to observe and document field activities including physically characterizing retrieved soil samples, screening retrieved soil samples with a PID for the presence of vapor organic vapors, selecting soil samples for laboratory analysis, and developing the newly-installed monitoring wells. The soil boring and monitoring well locations are depicted on Figure 2.

Each monitoring well consisted of 2-inch diameter schedule 40 threaded, flush joint polyvinyl chloride (PVC) pipe. Monitoring well CJ-4S was completed (and screened) in the overburden soils; monitoring wells CJ-1, CJ-2, CJ-3, and CJ-4D were completed (and screened) within the bedrock. Well construction was generally as follows:

- the lower extent of the PVC pipe within the soils and bedrock consisted 10 to 20 feet of "screen" with machine-slotted openings (0.01-inch diameter or 10-slot) and a bottom cap;
- the remaining section of the PVC pipe consists of 2-inch diameter, schedule 40, threaded, flush joint riser pipe extending to the ground surface;
- filter sand (i.e., silica sand) was placed in the annular space of the borehole around the PVC pipe screen and soils, extending to varying heights (approximately 0.5 feet to 3.5 feet) above the screen PVC pipe screen.;

- bentonite pellets/chips, ranging in thickness from approximately 5.5 to 20 feet were placed on top of the sand filter pack above which was placed soil cuttings generated from the boring. In some cases, an additional bentonite seal was placed closer to the ground surface; and

- a flush-mounted road box was cemented around the PVC pipe at the ground surface.

For those monitoring wells constructed with machine-slotted openings within the bedrock to monitor bedrock groundwater, the bentonite seal was placed within the borehole to a depth which spanned a vertical range above and below the soil/bedrock interface, therefore, attempting to seal off groundwater in the overburden soil, if present.

The monitoring well construction specifications are presented on the soil boring logs in Appendix G. Table 1 presents a summary of the well construction information, and Table 2 presents a summary of the water level measurement and the well and groundwater elevations.

6.2 Sampling and Analyses of Subsurface Soils and Groundwater

All samples submitted for laboratory analyses were collected by Cushing & Jammallo staff and transported by the laboratory courier, under a chain-of-custody, to the respective laboratory within an ice-packed cooler. AMRO Environmental Laboratories Corporation (AMRO) of Merrimack, New Hampshire and its subcontractor laboratory, Emanouil Research Laboratories of Bridgewater, New Hampshire, performed the analysis of the samples collected in June 2000. Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts and its subcontractor laboratories Servern Trent Laboratories of Monroe, Connecticut and Columbia Analytical Services of Rochester, New York, performed the analysis of the samples collected in July 2000.

6.2.1 Sampling and Analyses of Subsurface Soils

Soil samples collected from boring CJ-4S were field screened by the headspace method for the presence of organic vapors with the use of a Thermo-Electron Model 580B PID. The PID estimates concentrations (in parts per million, ppm_v) of organic vapors within the headspace of soil relative to a calibration gas standard. The instrument was calibrated using 100 ppm of isobutylene to respond as benzene. Screening of soil samples collected from depth rages of 5 to 7 feet, 10 to 12 feet, 15 to 17 feet, 20 to 22 feet, and 22 to 24 feet did not reveal PID readings above a background level of 0 ppm. Appendix G presents the results of the PID soil screening results on the soil boring log.

On May 30, 2000, one soil sample from boring CJ-4S (presented on the chain-of-custody record as CJ-4) was collected at a depth range of 10 to 12 feet below grade. This sample was subsequently submitted to AMRO for analysis of volatile organic compounds VOCs by EPA Method 8260B, including tentatively identified compounds (TICs). TICs are considered as Method 8260B non-target analytes that may be displayed on the associated VOC chromatogram. If non-target analytes were displayed, the laboratory was directed to qualify and, if possible, quantify the top ten TICs. The sample was placed in containers supplied by AMRO that had pre-measured amounts of methanol, as a chemical preservative, in each pre-weighed container so that the sample was preserved in accordance with EPA Method 5035. For quality control purposes, one methanol trip blank and one temperature blank was supplied by the laboratory. The samples were placed on ice and delivered to the laboratory for analysis. A chain-of-custody form was completed and included in the shipment.

Laboratory testing results revealed that no VOCs, including TICs, were detected by the laboratory above its applicable reporting limits for the soil sample nor from the methanol trip blank. The laboratory testing results are included in Appendix H.

6.2.2 Sampling and Analyses of Groundwater

6.2.2.1 General

In general, two rounds of groundwater samples were collected from the supply well located at Alliant Specialty Metals and newly installed and selected monitoring wells at JJA. One round of groundwater samples was collected from the three supply wells located at JJA. Water samples were analyzed in-situ for various parameters using portable testing equipment. In addition, water samples were delivered to a laboratory for analysis of various organic and inorganic parameters.

In consideration of natural attenuation as a future sole remedial measure for the VOC groundwater contamination at this Site, the field and laboratory testing program as part of the Site Investigation included various parameters, including terminal electron acceptors (TEA), that the NHDES recommends for the evaluation of the effectiveness of this remedial measure. The analysis of these parameters as part of the Site Investigation establishes the basis for this evaluation. As described in the NHDES document entitled "Guidelines for Selection of Natural Attenuation for Groundwater Restoration", dated October 1999, the following parameters as listed in Table 1 thereof, were included as part of the Site Investigation testing protocol:

- Dissolved oxygen (field)
- Nitrate (laboratory)
- Sulfate (laboratory)
- Methane (laboratory)
- Ferrous iron (laboratory)
- Soluble manganese (laboratory)
- Specific conductance (field)
- Chloride (laboratory)
- Oxidation reduction potential (ORP) (field)
- Total organic carbon (field)
- pH (field)
- VOCs (laboratory)
- Temperature (field)

Groundwater from overburden monitoring wells ATC-3 and ATC-4-1 were not sampled during the Site Investigation Program. Samples were not collected from ATC-3 because testing results of a sample and a sample duplicate collected from this

well in November 1999 did not reveal VOCs in concentrations at or above the laboratory's reporting limits. ATC-4-1 was not sampled because this well is located immediately adjacent to monitoring well ATC-4-2 (which was sampled) and these wells are constructed in a similar manner.

6.2.2.2 Well Purging and Sampling Techniques and Devices

The goal of the groundwater monitoring program was to obtain, to the extent practical, groundwater samples that would be representative of the hydrogeologic conditions in the vicinity of a given well, i.e., formation water. In some cases, this goal may not have been attained due to unavoidable circumstances.

Except for ATC-2, the purging and sampling of groundwater from monitoring wells was accomplished with the use of low-flow purging and sampling techniques and the use of a flow-through cell to monitor and measure certain chemical parameters in-situ. Low flow purging and sampling was accomplished with the use of either a Grundfos RediFlo 2 pump system that utilized a stainless steel submersible pump or a peristaltic pump. The intake of the Grundfos pump or the end of the tubing connected to the peristaltic pump was lowered to within the screened interval of each well for purging and sampling. Pumping rates could be controlled and varied with each system. Pumped groundwater from each well exited through polyethylene tubing that was connected to a flow-through cell at the ground surface. New, dedicated polyethylene tubing was used on each well during each sampling event. The flow-through cell was equipped with probes to measure pH, temperature, specific conductance, dissolved oxygen, and ORP. Two different flow-through cells were used, each of which was calibrated prior to use to the manufacturer's specifications. During the May 2000 sampling event, a Hydrolab Quantra Water Quality Monitoring System was used; during the July 2000 sampling event, a Hydrolab Surveyor 4a Water Quality Data Display with a Minisonde 4A Probe was used. Purging was generally considered complete and samples were collected from each monitoring well after it was determined that some or the majority of the parameters had stabilized. Stabilization was generally considered to be achieved when two consecutive readings of one or more of the following parameters were within the following limits: Dissolved oxygen, 10%; specific conductance, 5 %; temperature, 5 %, pH, +/- 0.1 unit; and/or ORP, +/-

10 millivolts.

During the first sampling round in May 2000, purging and sampling of monitoring well ATC-2 was initially attempted with the Grundfos pumping system in the manner described above. However, the water in this well was completely evacuated within two minutes of purging at a very low rate. Since water recovery was minimal after some period of time, it was decided to postpone the sampling of this well until the July 2000 sampling event. During the July 2000 sampling round, a polyethylene bailer was used to purge and sample this well. Even with the use of a bailer, the water in the well was evacuated during purging operations. However, the water was allowed to recovery sufficiently to obtain the appropriate sample volume. No in-situ or field measurements of pH, temperature, specific conductance, dissolved oxygen, or ORP were performed on groundwater from ATC-2.

Direct sampling of the groundwater from the three JJA supply wells (Supply Well 1, Supply Well 2, and Supply Well 3) and the supply well located at Alliant Specialty Metals (Alliant Well) was not performed because each of the wells is equipped with submersible pumps and various other electrical equipment within the borehole. Field testing of pH, temperature, specific conductance, dissolved oxygen, and ORP for these wells was accomplished by placing the flow-through cell within a clean bucket. Water from the tap associated with the respective well was directed into the bucket and at least one measurement of each parameter was obtained.

Samples of the water from the JJA wells were obtained as follows with the assistance of Mr. Robert Bean of JJA. The water sample from Supply Well 1 was collected from a valve opening connected directly to the well. According to JJA, this well is only used to irrigate portions of the Site and is not treated. At the time of Cushing & Jammallo's sampling, this well was not in operation. Therefore, the well was allowed to pump water at a rate of approximately 5 gallons per minute for approximately 60 minutes (total of approximately 300 gallons) prior to sample collection.

The water sample from Supply Well 2 was collected from a hose located exterior to the western side of the operations building. According to Mr. Bean this water is subjected to a treatment process as described in Section 2.3.1.

Water from Supply Well 3 was collected from a spigot located exterior to the northerly wall of the warehouse building. Similar to the water from Supply Well 2, this water is subjected to a treatment process as described in Section 2.3.1. Since Supply Wells 2 and 3 are in constant operation, samples were collected approximately ten minutes after discharging water from the respective taps.

JJA was directed to sample the Alliant supply well from a tap located within the interior northeast portion of the building. A hose was connected to this tap so that the discharge could be directed outside the adjacent doorway. According to a representative of Alliant Metals, water at this sampling location is not subjected to treatment.

6.2.2.3 In-Situ and Field Analysis

As described above, field testing of pH, temperature, specific conductance, dissolved oxygen, and ORP on each monitoring well, except for ATC-2, and the four supply wells was performed during each round of groundwater sampling completed as part of the Site Investigation. A summary of the field water quality testing results is provided for the wells during each sampling event in Tables 3 through 9.

6.2.2.4 Sample Containerization and Preservation

Water samples were placed in appropriate containers that were provided by either AMRO or Con-Test, depending upon the sampling event. The laboratories also provided the appropriate preservatives, as necessary, which they placed directly into the sample containers.

Water samples collected from the monitoring wells (except monitoring well ATC-2) for the analysis of ferrous iron and soluble manganese were filtered in the field with an in-line 0.45 micron filter. A dedicated filter was connected to the polyethylene tubing used with the pumping system just prior to sample collection for these parameters. Samples collected from the supply wells were not filtered prior to analysis of ferrous iron and soluble manganese. In this case, samples were placed directly in containers

that contained preservatives and analyzed without preservation. Samples from ATC-2 were placed directly into sample containers that did not contain preservatives. These samples were filtered by the laboratory and then preserved prior to analysis.

6.2.2.5 Laboratory Testing of Groundwater from Supply Wells

On June 15, 2000, groundwater samples were collected from each of the three supply wells at JJA (Supply Well 1, Supply Well 2, and Supply Well 3) and the Alliant Supply wells and were submitted to a laboratory for analysis of:

- VOCs by EPA Method 8260 plus TICs
- Total chloride
- Nitrate-nitrogen
- Sulfate
- Ferrous iron
- Soluble manganese
- Total organic carbon
- Methane

The Alliant Well was also sampled on July 20, 2000 and the sample from this event was submitted to the laboratory for analysis of VOCs by EPA Method 8260B plus TICs only.

A matrix of the various laboratory analyses for the associated supply wells is presented in Table 10. Tables 11, 12, and 13 summarize the testing results and Appendix I and Appendix J present the laboratory testing results.

VOCs

Tables 11 and 12 summarize the VOC testing results. They show that VOCs were reported by the respective laboratory in three of the four supply wells, JJA Supply Well 1, JJA Supply Well 2, and the Alliant Well. No VOCs were reported in JJA Supply Well 3. Supply Well 1 reportedly contained the following VOCs:

- 1,1-dichloroethene at 26 ug/l;
- 1,1-dichloroethane at 66 ug/l;
- 1,1,1-trichloroethane at 110 ug/l;
- MTBE at 15 ug/l.

The concentration of two compounds in Supply Well 1 exceeded New Hampshire standards. 1,1 Dichloroethene exceeded the AGQS of 7 ug/l and the Method 1 groundwater standards for categories NH GW-1 of 7 ug/l and NH GW-2 of 1 ug/l; MTBE exceeded the AGQS and the Method 1 groundwater standard for category NH GW-1 of 13 ug/l.

Supply Well 2 contained the following VOCs:

- 1,1-dichloroethene at 9.7;
- 1,1-dichloroethane at 21 ug/l; and
- MTBE at 25 ug/l.

The concentration of two compounds in Supply Well 2 exceeded New Hampshire standards 1,1 Dichloroethene exceeded the AGQS of 7 ug/l and the Method 1 groundwater standards for categories NH GW-1 of 7 ug/l and NH GW-2 of 1 ug/l; MTBE exceeded the AGQS and the Method 1 groundwater standard for category NH GW-1 of 13 ug/l.

The Alliant Well contained MTBE at a concentration of 12.6 ug/l and 23 ug/l, which is above the AGQS and the Method 1 groundwater standard for category NH GW-1 of 13 ug/l.

Natural Attenuation Parameters

Table 13 summarizes the laboratory testing results for natural attenuation parameters. The supply well testing results reveal no parameters were identified by the laboratory at or above the AGQS and Method 1 standards for those analytes with established AGQS and Method 1 standards.

6.2.2.6 Laboratory Testing of Groundwater from Monitoring Wells

On June 14 and June 15, 2000 and/or July 20 and 21, 2000, groundwater samples were collected from seven monitoring wells at JJA (ATC-2, ATC-4-2, CJ-1, CJ-2, CJ-3, CJ-4S, and CJ-4D) and were submitted to a laboratory for analysis of:

- VOCs by EPA Method 8260 plus TICs
- Total chloride
- Nitrate-nitrogen
- Sulfate
- Ferrous iron
- Soluble manganese
- Total organic carbon
- Methane

A matrix of the various laboratory analyses for the associated supply wells is presented in Table 10. Tables 11, 12, and 13 summary the testing results and Appendix I and Appendix J present the laboratory testing results.

VOCs

Tables 11 and 12 summarize the VOC testing results.

Laboratory testing results reveal that no VOCs were identified in groundwater samples at or above the laboratory's applicable reporting limits from monitoring wells CJ-1 and CJ-2 or the associated trip blanks. Both of these wells were installed to monitor bedrock groundwater. However, one or more VOCs were reported by the laboratory in the overburden monitoring wells CJ-4S and ATC-4-2. These VOCs included:

CJ-4S

- 1,1-dichloroethene (1.6 ug/l)
- 1,1-dichloroethane (1.0 ug/l)
- 1,1,1-trichloroethane (9.5 ug/l, 16.0 ug/l)
- trichloroethene (7.1 ug/l, 16.8 ug/l)

ATC-4-2

- 1,1-dichloroethane (18 ug/l, 3.6 ug/l)
- 1,1,1-trichloroethane (4.9 ug/l)
- chloroethane (8.0 ug/l)
- MTBE (6.8 ug/l)